the question of geological age, we agree with Nathorst's verdict that the plant-bearing beds must be assigned either to an Upper Jurassic or to a Lower Cretaceous horizon. Several of the plants suggest a comparison with Inferior Oolite species from the rich plant-beds of the Yorkshire coast, and it is not improbable that in the fragmentary fossils from Cape Flora we have the remains of a flora but slightly younger than that which has left abundant traces in the Lower Oolite strata of more southern latitudes. While admitting the danger of attempting to assign an exact geological date to the fragmentary and imperfect specimens, there can be no doubt that they must be referred to a period anterior to the Tertiary, and in all probability they are remnants of an Upper Jurassic flora.

While regretting that the fossils from Franz Josef Land are not more numerous and less fragmentary, we may offer a hearty welcome to the two able palæontological memoirs by Dr. Pompeckj and Prof. Nathorst; these authors, in carrying out their difficult tasks with thoroughness and good judgment, have set a standard of efficiency which promises well for the succeeding volumes of the "Scientific Results" of the Nansen Expedition. A. C. S.

As might have been expected, no birds new to science were obtained during the voyage of the *Fram*; nevertheless, some interesting observations were made on the range and distribution of bird-life in the high north, while naturalists have, apparently for the first time, been made fully acquainted with the early plumage of the roseate gull. In the course of the expedition birds were observed in the highest latitudes in which they are definitely known to be able to exist. During the summer of 1895, when the vessel was between 84° and 85° 5′ north lat., in the neighbourhood of Franz Josef Land, ten species were from time to time observed, although none occurred in any numbers. The one found farthest north was the Fulmar petrel, which was seen in lat. 85° 5′; in the last edition of "Yarrell" the extreme range of this bird is given as 82° 30′.

During the summer of 1896, when the *Fram* was north of Spitzbergen, the first herald of returning bird-life was a snow-bunting, which made its appearance on April 25. From the observations made during the same season, it is now evident that to the north of Spitzbergen, between lat. 81° and 83°, the Arctic Ocean is the resort of large numbers of birds, belonging, however, to comparatively few species. Apparently these consist for the most part of immature individuals, in the first plumage, which spend the summer among the open channels in the ice. The little auk and the ivory gull were among those most numerously represented; Sabine's gull having only been seen on a single occasion. Although swimming birds were by far the most numerous in these high latitudes, shore-haunting species were represented by the ringed plover and the grey phalarope, which were seen running about on the ice by the side of the open water.

The fasciculus is illustrated by an artistic plate of the roseate gull in its first plumage, which is mainly brown on the upper-parts, and therefore quite unlike that of the adult. R. L.

THE CYANIDE PROCESS.

The Cyanide Process of Gold Extraction. By James Park. Pp. viii + 127. (London: Griffin and Co., Ltd., 1900.)

THE great success which has attended the introduction of potassium cyanide for the extraction of gold has created a widespread interest in this chemical process, and given rise to several books and papers on the subject from various authors. When we consider that at one large works 500 tons of gold are treated in twenty-four hours, we understand on what a colossal scale the cyanide method is worked. The process, like many others, has grown up from small beginnings, and it is largely owing to Messrs. MacArthur and Forrest that cyanide of potassium is now successfully applied to the treatment of gold ores in different parts of the world.

It is a most significant sign of the times that men who have been practically engaged in an enterprise are willing to communicate the results of their experience to the public at large, and from the manner in which the literature of the subject is growing, every detail requisite for economic working will soon be widely known and utilised. Therefore, one is not inclined to analyse the text too minutely, with the object of finding small flaws, provided the information is broadly reliable and accurate. It was inevitable that electricity should be brought into play in connection with such an important process, and we find Messrs. Siemens and Halske early in the field, with a method of depositing the gold on lead by means of electrolysis. There are two sides to this subject, as to most others, viz. the economic, or practical as it is termed, and the scientific. Now the former seems to be fairly well treated, but what is wanted is much greater attention to be paid to the latter, as it is possible that, with fuller and more intimate knowledge, potassium cyanide may be equally useful in the treatment of other metals besides gold, especially as it is now so largely used in the electro-deposition of gold, silver, copper, brass, &c. The work under notice has passed through three editions in New Zealand, and this is the first English edition. It is intended for the use of students, metallurgists and cyanide operators. Several new illustrations and tables are added, and the information relating to the treatment of slimes and the analysis of solutions has been greatly extended. It is gratifying to learn that wet crushing and cyanide treatment have been followed with as much success in New Zealand as in South Africa, although the ores are of a complex character.

The arrangement of the contents of the book is admirable. After a brief introduction and a general statement as to the limitations of the subject, the chemistry of the subject is wisely introduced, so that the student is at once brought face to face with the various reactions that occur, and led to see the reason for loss of cyanide, which is sometimes so excessive. Valuable information is given on pp. 10–13 on the action of potassium cyanide on metallic sulphides. A very useful chapter on laboratory experiments will be appreciated by teachers and students of metallurgy, as well as by the chemist and works manager; indeed, a commodious and well-

equipped laboratory is one of the most important and necessary parts of a cyanide plant. The control, testing, and analysis of solutions is treated in a fuller manner than is usual with books of this class, and of the three methods given we prefer the silver nitrate test. The tables for the assay of cyanide solutions are a useful addition to this chapter. The appliances for cyanide extraction are briefly described, and although accompanied by several good scale drawings, certain details are omitted which might have been profitably included.

The synopsis of the process for the actual extraction by potassium cyanide is well written, and the conditions for successful treatment, such as strength of cyanide solution, &c., are stated as clearly as one could wish. Chapter vii. deals with the applications of the processes at different works. Leaching and precipitation are succinctly dealt with in Chapters viii. and ix. These are followed by a short description of the Siemens-Halske electrical process, which not only deposits the gold, but gives rise to the production of a number of valuable commercial bye-products, such as lead, copper, litharge and paint. For all those who wish to obtain a sound knowledge of the cyanide process, as conducted at the present time, we heartily commend Park's handbook.

OUR BOOK SHELF.

The Cause and Prevention of Decay in Teeth. By J. Sim Wallace, M.D., B.Sc., L.D.S. Pp. 101. (London: J. and A. Churchill, 1900.)

THIS is a reproduction in book form of a series of articles published in the *Journal* of the British Dental Association.

The subject has been dealt with in the light of the now universally accepted chemico-parasitic theory of dental caries, but the author treats less of exciting or immediate causes than of those remote and predisposing. He attributes the great and increasing prevalence of dental caries among civilised nations to the elimination of the coarser and more fibrous parts of foodstuffs from the diet, and points out that this may act in two ways. Firstly, owing to the absence of mechanically detergent constituents of food, more of the fermentable, acid-producing and germ-sustaining parts of the latter remain in contact with the teeth for some time after meals. Secondly, that the tongue, being less actively employed during the act of chewing and swallowing, fails to attain its full size and exercise its normal important function in modelling the dental arches, so that irregularities arising from crowding and malposition of the teeth serve to intensify their predisposition to caries.

The subject is, on the whole, efficiently dealt with, and the book may be recommended to the medical practitioner or intelligent layman.

It is a pity, however, that the author lays such persistent stress upon what he considers the daring heterodoxy of his opinions, as these are at most modifications of those currently accepted. It is somewhat irritating, too, to find set forth for the instruction of the dentist, and with an air of great originality (as on p. 94), certain points in the operative treatment of caries which are among the very first impressed upon all students in schools of dental surgery.

Surely, too, the accusation of ignorance of the causes of the diseases he attempts to combat, and empiricism in practice, are undeserved by the educated dental surgeon of to-day. HAROLD AUSTEN.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Atmospheric Electricity.

IN a letter on this subject in NATURE of March 29, Mr. Aitken criticises the theory which attributes the prevalence of positive electrification in the atmosphere to the superiority in efficiency as nuclei for the condensation of water vapour, of the negative ions over the positive.

That any difference in the degree of supersaturation necessary to make water condense on positively and on negatively charged ions would result under suitable conditions in the production of an electric field was pointed out by Prof. J. J. Thomson (*Phil. Mag.* vol. xlvi. p. 533), and it was suggested by him that this might be a source of atmospheric electricity. Experiments made by the present writer proved that there is such a difference, and that water vapour condenses much more readily on negative than on positive ions; while Elster and Geitel (and independently, Lenard) have recently brought forward evidence based on their own experiments and those of Liuss, tending to show the existence of free ions in the atmosphere.

There remains the question whether the necessary degree of supersaturation can ever occur in the atmosphere. Mr. Aitken contends that there is no such thing as dust-free air in the atmosphere, and that therefore any considerable degree of supersaturation is impossible.

Air practically dust-free does, however, seem to have been met with on Ben Nevis, accompanied by something very like supersaturation (Rankin, *Journ. Scot. Met. Soc.* vol. ix. p. 131). In Mr. Aitken's own papers, too, records of small numbers of dust particles (sometimes considerably less than 100 per c.c.) are not rare; and the lowest values are met with just under the conditions where their occurrence is of most significance. For "most of the low numbers in the tables were observed during rainy weather, and the very low ones in misty rain, when the clouds were at or near the surface of the earth" (Aitken, *Edin. Trans.* xxxvii. p. 664). Again, the purest air met with by Mr. Aitken was that blowing from off the Atlantic Ocean, the mean number of dust particles in a series of 258 observations extending over nearly five years amounting to 338 per c.c.; on one occasion the number was as low as 16 per c.c. (*Edin. Trans.* xxxvii. p. 666). Air coming from such a region can hardly be considered as abnormal. Moreover, such observations are necessarily made in air within a few feet of the ground; at a greater height it is likely to be less contaminated.

Consider a mass of air occupying 1 c.c. and saturated with water-vapour at 10° C., and let it expand till, say, 3×10^{-6} gram. (less than one-third of the total water) has condensed to form 100 drops. Let us suppose the drops to be equal in size and let us calculate the volume and thence the radius of each drop, and from this obtain the rate at which they will fall relatively to the air (assuming the velocity $= \frac{2}{9} g \frac{r^2}{\mu}$, the viscosity μ being taken as $1{\cdot}8 \times 10^{-4}$). We obtain for the radius of each drop the value $1{\cdot}9 \times 10^{-3}$ centim., and for the rate of fall through the air, $v = 4{\cdot}4$ cms. per second.

In a rising current of moisture-laden air containing 100 dust particles per c.c. there is thus no difficulty in seeing how the drops as they ascend may grow large enough to lag behind the air at the rate of 4·4 cms. per second (= 160 metres per hour); while the greater part of the moisture in the surrounding air is still retained as vapour. If then the upper surface of the cloud is carried to such a height that the drops reach the size $r = 1{\cdot}9 \times 10^{-3}$ cm., it will there be lagging behind the rising air at the rate named, and a dust-free layer must exist immediately above it, increasing in vertical thickness at the rate of something like 180 metres per hour. Even if 1000 drops were formed in each c.c. of the cloud, the rate of growth of the dust-free layer would, as a similar calculation shows, when the same quantity of water had separated, amount to 34 metres per hour.

A difficulty raised by Mr. Aitken in connection with the removal of dust particles by condensation of water upon them is this: "When a cloud forms in ordinary impure air, only a small proportion of the dust particles become active centres of